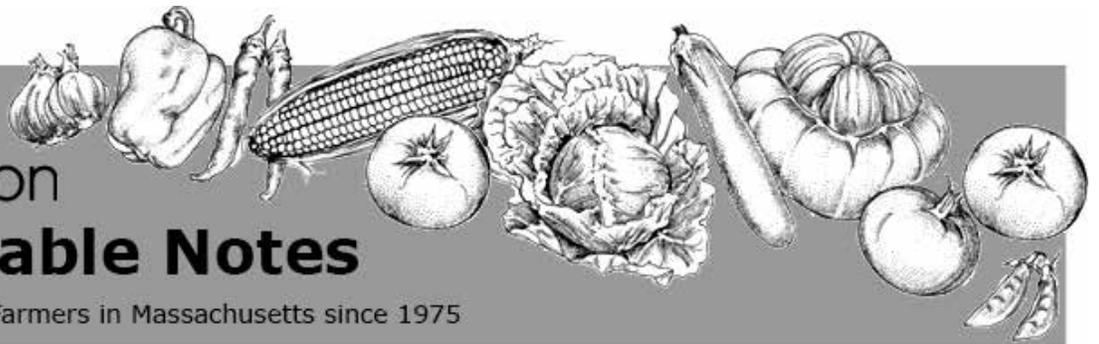




UMass  
Extension

# Vegetable Notes

For Vegetable Farmers in Massachusetts since 1975



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*Nick Skinner talks about and experimental UV light “sprayer” at the twilight meeting at Ward’s Berry Farm in Sharon MA yesterday.*

*Photo: S. B. Scheufele*

## CROP CONDITIONS

Summer crops are still producing heavily, if they made it through the disease-aftermath of wet July, and crews have been in the steady rhythm for a while now of harvesting tomatoes, peppers, eggplant, melons, and sweet corn. Labor shortages have been widespread this year, sometimes meaning that fields that should have been weeded weren’t and now the crops may be a total loss, and sometimes meaning that crops couldn’t be harvested and were put up as U-pick this year. With the exception of the rain this morning and patchy rain in some locations last week, it had been relatively dry and growers were needing to irrigate. Folks were scrambling to get fields cultivated or planted, tomatoes harvested, and onions inside to cure before the big rains and in some cases tornado warnings this morning, and there is more rain in the forecast for the weekend. As we near September, growers are starting to think about fall crops—harvesting, storing, and marketing. We’ve had reports of delayed winter squash plantings that were setback by the weather in July and are just starting to fill in with fruit now. It has also been a rough year for sweet corn; later plantings are looking better now but a new wave of caterpillar pests is in the crop now and susceptible blocks should be sprayed—see the table and report below. Thanks to all of you who came out to our Twilight Meetings the last few weeks, it has been really nice to see you all in person again! We have one more meeting coming up, a noon-time Zoom meeting on improving the profitability of winter spinach production, sing up [here!](#)

## PEST ALERTS

### Brassicas

**Ants** were observed this week causing significant damage in a field of brassicas in Franklin Co. The ants were feeding on recently transplanted brassica stems and roots, girdling plants and causing stunting, wilting, and plant death. This problem has been observed sporadically in brassicas across New England over the last few years. It doesn’t seem to occur in the same field year after year. There are no pesticides labeled for ant control in vegetable crops. Boric acid ant baits placed around an affected crop may provide some control in a small area but bait material is not labeled to be applied directly to vegetable crops.



*Flea beetle feeding damage in beets. Photo: G. Higgins*

### Chenopods

**Flea beetle** damage was observed in a beet field in Hampshire Co. this week. Feeding damage was on the upper side of the leaves – the lower side of the leaf remained

## CONTACT US:

Contact the UMass Extension Vegetable Program with your farm-related questions, any time of the year. We always do our best to respond to all inquiries. **Office phone:** (413) 577-3976 *We are currently working remotely but checking these messages daily, so please leave us a message!* **Email:** [umassveg@umass.edu](mailto:umassveg@umass.edu)

**Home Gardeners:** Please contact the UMass GreenInfo Help Line with home gardening and homesteading questions, at [greeninfo@umext.umass.edu](mailto:greeninfo@umext.umass.edu).

intact. Several species of flea beetles feed on beets and chard. Most have a wide host range and tend to be moving among various crops and weeds. Most are black. The species that feed on brassicas do not tend to feed on beets or Swiss chard. Flea beetles are usually not a significant pest on beets or chard.

### Cucurbits

**Downy mildew** is still spreading throughout the region on cucumber and cantaloupe. It has not been reported on winter squash, zucchini, or pumpkins north of Kentucky but the recent storm has increased the risk of DM development on all of these crops. It is now warranted to apply a targeted DM fungicide to winter squash and pumpkin crops--photos of symptoms on these crops are pictured right. Spots on pumpkins and butternut are similar to those on cucumber but smaller and usually with less sporulation. It's easy to confuse powdery mildew for downy mildew, since powdery mildew can cause yellow spots on upper leaf surfaces, but when turned over you will see white sporulation on the underside and not the gray spores produced by downy mildew. If you suspect downy mildew on pumpkins or winter squash, please let us know at [umassveg@umass.edu](mailto:umassveg@umass.edu) so we can track this important disease.



*Symptoms of downy mildew on the top of a pumpkin leaf (left) and underside (right).  
Photos: T. A. Zitter*



*Powdery mildew on pumpkin. Round, white spots of sporulation are visible on the top of the leaf. The yellow spots on the leaf correspond with white sporulation on the underside of the leaf. Photo: H. Whitehead*



*Gray sporulation of downy mildew on the underside of a pumpkin leaf. One spot of powdery mildew can be seen in the top center of the photo.  
Photo: M. T. McGrath*

### Solanaceous

**Late blight:** Conditions are favorable for late blight development and we're starting to see outbreaks pop up on both potato and tomato in the Northeast, though reports are not widespread and are not from southern New England—outbreaks were confirmed in Aroostook Co., ME and Norfolk Co., Ontario last week. If you have a tomato or potato crop that you expect will keep going for a significant amount of time, you may want to begin applying protectant fungicides. Fungicides that are being applied for early blight and other fungal pathogens will



*Anthracnose on tomato fruit.  
Photo: H. Whitehead*

**Table 1. Squash Vine Borer trap captures, week ending August 18, 2021**

Location	SVB
Deerfield	1
North Easton	1
Westhampton	0
Whately	0
Sharon	0
Leominster	1

also provide some protection against late blight. At this point in the season, with the level of risk presented by the current reports, we don't recommend applying targeted late blight materials to potato or tomato.

[Anthracnose](#) was reported on tomato fruit in Hampden Co. this week. Anthracnose is a fungal disease that most commonly infects ripe or overripe tomato and pepper fruit. Spores are spread via splashing rain and workers and equipment moving through fields. The pathogen survives on crop residue and can be seed-borne. Removing affected fruit from the field and harvesting fruit before it's fully ripe may help reduce yield losses. For a list of labeled fungicides, see the [outdoor tomato disease control section](#) of the New England Vegetable Management Guide.

**Table 2. Sweetcorn pest trap captures for week ending August 18**

Location	GDD (base 50°F)	ECB NY	ECB IA	FAW	CEW	CEW Spray Interval
<b>Western MA</b>						
Deerfield	2037	0	0	0	11	4 days
Sheffield	-	0	1	-	15	4 days
Southwick	1976	10	2	4	20	4 days
Whately	2107	1	0	0	1.5	6 days
<b>Central MA</b>						
Lancaster	1952	8	0	0	2	6 days
Leominster		5	0	7	1	no spray
Northbridge	1838	0	3	2	9	4 days
Spencer	1931	0	4	1	1	no spray
<b>Eastern MA</b>						
Ipswich	1898	6	0	0	36	4 days
Concord	1997	21	8	1	15	4 days
Millis	-	3	2	N/A	8	4 days
North Easton	2052	0	0	-	2	6 days
Sharon		0	0	N/A	8	4 days
Seekonk	2241	1	0	26	4	5 days
Swansea		0	0	0	6	5 days
- no numbers reported for this trap						
N/A this site does not trap for this pest						
*GDDs are reported from the nearest weather station to the trapping site						

**Sweet Corn**

[Corn earworm](#) numbers have increased dramatically from last week in many locations, with most traps indicating a 4- to 6-day spray schedule. [Fall armyworm](#) numbers are also up in some locations, although this increase is patchy. We are still amidst the second generation of [European corn borer](#)—the second generation has less of a distinct peak of emergence and is more spread out over several weeks—and trap counts are higher this week than last week in several locations. Some of the trap counts reported in our table are from late last week and don't reflect this increase. Some trapping sites indicate “no spray” for CEW but ECB and FAW are likely present in whorl stage and pre-tassel corn and spray decisions should also take scouting results into consideration and spray if over 15% of plants are infested. It has been a tough year for corn and we are hearing a lot of reports of low yields. Caterpillars are starting to be seen now in later plantings that are pre-tassel, so be sure to stay on top of scouting and spray schedules in that young corn to maximize your yields where it's still possible!

**IDENTIFYING DISEASES OF CARROTS**

Carrots are becoming a more important crop for many growers, as folks look to increase winter sales in expanding year-round markets. Carrots can be affected by many bacteria, fungi, and nematodes in the field or while in storage. Foliar diseases may cause lower yields due to loss of photosynthetic ability, difficulty harvesting if the tops are weakened, and lower marketability if the carrots cannot be sold in bunches. Root diseases can lower yields of fresh eating carrots and can spread in storage, drastically reducing sales through later markets. Root diseases are caused by soil-dwelling organisms and therefore their incidence may vary considerably from farm to farm or even from one side of a field to the other. Proper disease identification will help you to prevent future outbreaks by adjusting crop rotations accordingly, and prevent moving infested soil from field to field. Some of the major carrot disease symptoms are described below. If you are notic-

ing foliar or root symptoms like those described, send a sample to your state diagnostic lab to confirm, and take steps to protect current and future crops. See the [UMass Diagnostic Lab website](#) for their sample submission instructions.

## Foliar Diseases

**Alternaria leaf blight** (*Alternaria dauci* and *A. radicina*) symptoms first appear along leaflet margins as greenish-brown, water-soaked lesions, which enlarge, turn brown to black, and often develop a yellow halo. Older leaves are more susceptible to infection. When about 40% of the leaf is infected, the leaf yellows, collapses, and dies. Lesions on petioles are also common and can quickly kill entire leaves. *A. radicina* can also produce a dry, mealy, black decay on known as **black rot on carrot roots** held in storage.

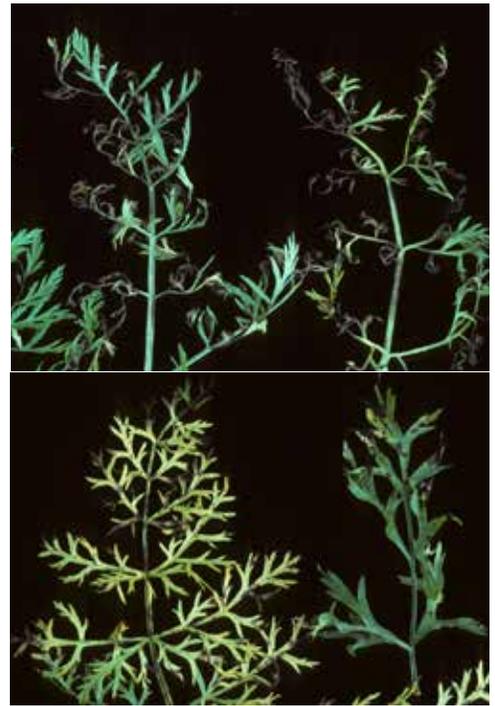
**Bacterial leaf blight** (*Xanthomonas campestris* pv. *carotae*) symptoms initially look similar to those of *Alternaria* leaf blight; symptoms appear primarily on leaf margins as small, yellow, angular leaf spots, which expand, turn brown to black with a yellow halo, and become dry and brittle. Leaflets may become distorted and curled. Symptoms can extend into petioles where they produce a yellow-brown, gummy exudate, and may also occur on flower stalks. Infected umbels can be completely blighted and seed infection can occur—use treated seed to prevent introducing this disease.

## Root Diseases

**Root knot nematode** (*Meloidogyne hapla*) forms galls or root thickenings of various sizes and shapes. Where soil populations of *M. hapla* are high, symptoms include stunted plants, uneven stands, premature leaf death, and forking and swelling of both lateral and tap roots, which can significantly reduce marketable yield. *M. hapla* persists in the soil and has a very wide host range so rotation can be difficult, but grasses are non-hosts so small grains, corn, and grassy cover crops like Sudangrass can be grown in rotations to reduce the size of the population.

**Black root rot** (*Thielaviopsis basicola*) occurs primarily in storage when conditions are not ideal and temperature and humidity are too high. The fungus causes superficial, irregular, black lesions on roots. The discoloration, caused by masses of dark brown to black chlamyospores, is limited to the skin. The pathogen rapidly invades wounded tissue and is favored by long post-harvest periods without cooling, so careful harvest and immediate cooling (< 41°F) can minimize the impact of this disease.

**White mold** (*Sclerotinia sclerotiorum*) affects many vegetable crops but carrots are particularly susceptible, especially late in the season and during storage. The fungus may be present in soil, storage areas, or containers. Symptoms include characteristic white mycelial growth and hard, black sclerotia (masses of fungal tissue that serve as long-term survival structures), which may be seen on the crown of infected carrots. In storage, carrots develop a soft, watery rot, and fluffy, white mycelia and sclerotia can also develop. Sclerotia can persist in soil for many years and the fungus has a very wide host range, making this disease difficult to manage. Grasses and onions are non-hosts that can be used in rotations, and a commercially available biocontrol product, Contans, has been shown to be effective in parasitizing overwintering sclerotia. Contans should be incorporated into infested soils in the fall to give the biocontrol fungus time to infect the sclerotia.



*Alternaria* leaf blight (top) and bacterial leaf blight (bottom). Photos: R. L. Wick



Root knot nematode. Photo: R. L. Wick



Black root rot. Photo: R. L. Wick



White mold. Photo: W. Brown

**Cavity spot and root dieback** (*Pythium* spp.) Infections from several *Pythium* species can occur during early root development and are favored by moist soil conditions. Root dieback symptoms appear as rusty-brown lateral root formation, or forking and stunting; symptoms that can be easily confused with damage from nematodes, soil compaction or soil drainage problems. Cavity spot often shows up later in the season, closer to harvest. Horizontal, sunken lesions varying in size from 1-10 mm appear on the surface of the root and can provide an ingress for secondary fungal or bacterial infections.



Cavity spot. Photo: S. Livingston

**Crown rot** (*Rhizoctonia carotae*) Early symptoms are horizontal dark brown lesions around the root crown. As the crop matures, the tops may die in patches in the field and as the disease progresses, lesions coalesce to form large, deep, rotten areas on the crown of the root. *R. carotae* can also cause crater rot and violet root rot, but these diseases are less common in MA. Crown rot is favored by moist conditions, so planting on raised beds and/or in well-drained fields can minimize disease incidence.



Scab. Photo: R. L. Wick

**Scab** (*Streptomyces* spp.) can cause both raised and sunken, dry, corky lesions on the carrot root. This disease is less common and when it does occur symptoms are rarely severe enough to cause major losses in yield or marketability. Avoid planting carrots in alkaline soils, which are known to favor the incidence of scab, or in potato fields with high incidence of scab, as the species that infects potatoes can also infect carrots.

**Bacterial soft rot** (*Pectobacterium carotovorum* subsp. *carotovorum*) is a common disease in storage where it infects roots that were previously wounded or diseased. It occurs in the field only rarely, under extremely wet soil conditions. Symptoms start as small, water-soaked lesions that quickly spread and cause affected areas to become mushy, though the skin may remain intact over the liquefied flesh underneath. To avoid problems in storage, avoid wounding carrots during harvest and washing and maintain proper storage conditions.

To avoid losses in storage, try to achieve optimum storage conditions of 32-34°F (essential to minimize decay and sprouting during storage) and high relative humidity (required to prevent desiccation and loss of crispness). Mature topped carrots can be stored for 7-9 months at 32°F with 98-100% RH. Those ideal conditions are difficult to achieve and topped carrots are often successfully stored for 5-6 months at 32-41°F with 90-95% RH. Prompt cooling of harvested carrots to below 41°F also helps maintain crispness. Carrots produce very little ethylene (a byproduct of respiration) themselves but are sensitive to ethylene produced by other crops in storage and exposure causes production of the bitter compound isocoumarin, which is concentrated in the peel—peeled carrots are not affected. Unless outside temperatures are very low or very high, ventilation is an inexpensive method of reducing ethylene levels. Ethylene can also be absorbed on commercially available potassium permanganate pellets.

--Written by Susan B. Scheufele, UMass Extension

## PUMPKIN & WINTER SQUASH HARVEST, CURING & STORAGE

Pumpkin and winter squash are sizing up in the field, and harvest is on the horizon. Correct harvest timing, curing and storage conditions can significantly affect eating quality, storage length and post-harvest disease.

**Harvest Timing for Winter Squash and Pie Pumpkins:** For winter squash and pie pumpkins, harvest timing determines the flavor and texture of the fruit. As squash fruits grow, they accumulate starch, which is then converted into sugar in the field and during storage. The balance of starch (texture) and sugar (sweetness) in a squash determines the eating quality. Squash is mature when seeds are completely filled.



Delicata squash

If squash is harvested before it is mature, the fruit will use starch reserves from the flesh to fill the seeds, resulting in poor flesh quality. Immature squash will also not have enough starch to convert into sugar later on.

Most squash varieties are mature and ready to harvest 50-55 days after fruit set, or days after pollination (DAP). In many varieties, this is many weeks after the fruit turns a marketable color, which can be misleading. Dr. Brent Loy, former researcher emeritus at the NH Ag Experiment Station, says that days to maturity listed in seed catalogs are often incorrect, especially for acorn squash; catalogs often state 70-76 days to maturity (from time of seeding) when in reality it's more like 90-100 days to maturity. It's not necessarily easy to keep track of fruit set, so there are some other indicators that squash is ready for harvest—see the end of this article for more information about specific varieties.

**Harvest Timing for Pumpkins:** Since the pumpkin market lasts from Labor Day to Halloween, pumpkins may need to be held for several weeks before they can be sold. One factor in deciding when to harvest is the condition of the vines. Intact foliage protects fruit from the sun, and when vines and foliage die down from powdery or downy mildew, fruit can get sunscald. There are several races of cucurbit downy mildew, and only some affect pumpkin. So far this year, downy mildew on pumpkin has not been reported north of Kentucky. However, powdery mildew is widespread. Foliar diseases, especially powdery mildew, can also reduce the quality of pumpkin handles, leading to reduced marketability for jack-o-lantern pumpkins. As September approaches, the other major factor in deciding when to harvest is avoiding chilling injury. Chilling hours accumulate when squash or pumpkins are exposed to temperatures below 50°F in the field or in storage. Injury increases as temperature decreases and/or length of chilling time increases. This is particularly important for squash headed into long-term storage.

There can be extra work involved in bringing fruit in early and finding good storage locations, especially for growers who normally have pick-your-own harvest. However, we recommend that growers harvest as soon as crops are mature and store under proper conditions, if it is feasible. Proper curing and storage conditions are key for pumpkins in particular, because improper conditions can result in handles shrinking and shriveling, making the pumpkins unmarketable. If you need to hold fruit in the field for pick-your-own or any other reason, using a protectant fungicide (e.g. sulfur, oil, or chlorothalonil) along with one of the targeted powdery mildew products can help protect from black rot, powdery mildew, and other fungal fruit rots. For information on identifying and controlling fungal fruit rots of winter squash, see the [September 3, 2020 issue of Veg Notes](#). Scout for insects feeding on the fruit and handles, which may include squash bug nymphs and adults and striped cucumber beetles, and control them if damage is evident. See the [Pumpkin, Squash, & Gourds insect control section](#) of the New England Vegetable Management Guide for treatment recommendations.

**Harvest:** Despite their tough appearance, squash and pumpkin fruit are easily damaged. It is important to avoid bruising or cutting the skin during harvest. Once the rind is bruised or punctured, decay organisms will invade the fruit and quickly break it down. Place fruit gently in containers and move bins on pallets. Use gloves to protect both the fruit and the workers. For some squash, especially butternut, stems can be removed to prevent them from puncturing adjacent fruit during harvest and storage. If stems are removed, allow the stem scars to heal before putting into storage (see Curing below).

**Curing:** For some squash types (e.g. acorn and delicata), the mature fruit can be eaten immediately after harvest. Other squash types (e.g. butternut, hubbard, kabocha), need more time to convert starches to sugars and must be cured or stored for specific amounts of time before they are eaten.

Curing speeds up the conversion of starches to sugars so that squashes reach optimum eating quality sooner. It also causes fruit skin to harden and accelerates wound healing to prevent disease development. *P. maxima* and *moschata* squash varieties can be cured to hasten market readiness. However, curing is not always necessary: if you are planning to store squash for a few months before selling, and the fruit is free of wounds, it should have sufficient time to convert starches to sugars and can go directly into storage conditions without the extra boost. *P. pepo* squash types are ready to eat at harvest (if harvested when mature!) and curing can actually reduce their



*Butternut squash curing in a high tunnel*

storage lifespan.

To cure squash, store it for a short period of time (5-10 days) at a high temperature (80-85°F) and 80-85% relative humidity immediately after harvest. This can take place in the field if weather allows (night temperatures should not drop below 60°F), or in a well-ventilated barn, greenhouse, or high tunnel.

**Storage:** Pumpkins and winter squash should be stored in a cool, dry, well-ventilated area. Store fruit at 50-60°F with 50-70% relative humidity. Chilling injury is possible at temperatures below 50°F, and long-term storage at temperatures above 60°F will result in weight loss due to increased respiration rates. Large fluctuations in temperature favor condensation on fruit within the bin, which encourages disease. Therefore, fruit temperature should be kept as close to the temperature of the air as possible to avoid condensation and fruit rot. Relative humidity above 70% provides a favorable environment for fungal and bacterial decay organisms, and relative humidity below 50% can cause dehydration and weight loss. In a greenhouse, temperature can be managed with ventilation on sunny days; heaters will be needed for storage into November and beyond. An inner curtain can reduce heat loss and cost.

Storage life depends on the condition of the crop when it comes in and your ability to provide careful handling and a proper storage environment. All fruit placed in storage should be free of disease, decay, insects, and unhealed wounds. See the end of this article for maximum storage times for different types of squash. Fruit that has been exposed to chilling temperatures (below 50°F) will not store well and should be marketed first.

Few farms have the infrastructure to provide ideal postharvest conditions for all of their fall crops. Fortunately, finding a method that is 'good enough' often does the job. Even if it is difficult to provide the ideal conditions, storage in a shady, dry location, with fruit off the ground or the floor, is preferable to leaving fruit out in the field.

#### **Harvest timing and storage needs for different squash types:**

***Cucurbita pepo* (acorn, delicata, sweet dumpling, some pie pumpkins):** Acorn squash turns dark green 2-3 weeks after fruit set, which is 40-50 days before it should be harvested. Because acorn squash can be marketed as soon as it turns dark green, regardless of eating quality, many acorn varieties will never accumulate enough starch and will therefore never be sweet. UNH has developed two varieties, 'Honey Bear' and 'Sugar Dumpling', that both have high sugar content at harvest. Harvest *C. pepo* squashes when the 'ground spot' (the part of the squash that lays on the ground) is dark orange. Pie pumpkins should be harvested when the skin is fully orange. These varieties can be eaten at harvest and will store for 2-3 months. They should not be cured, because it can reduce their lifespan in storage.

***Cucurbita maxima* (kabocha, hubbard, buttercup):** Stems becomes dry and corky when the fruit is ready to be harvested. These are more susceptible than other squash to sunburn and so if vines go down from disease, they should be harvested early (40 DAP), cured, then stored at 70-75°F for 10-20 days to achieve acceptable eating quality. These have high starch content at harvest and so need to be stored for 1-2 months before being eaten, with the exception of all mini-kabochas and all red-skinned kabochas, which can be eaten at harvest. They will store for 4-6 months.

***Cucurbita moschata* (butternut, some edible pumpkins):** Butternut will turn tan 45 DAP but should not be harvested for another 2 weeks. Mini-butternut can be eaten at harvest and will store for 3 months. All others should be stored 1-2 months before eating to allow for starches to be converted into sugars and will store for 4-6 months. Carotenoid, the pigment that gives squash its yellow/orange color, also increases in storage for these squash, giving them more color and making them more nutritious.

--Written by G. Higgins and R. Hazzard, compiled 2018 from [Eating Quality in Winter Squash and Edible Pumpkins](#) and [The Nuts and Bolts of Fruit Quality in Cucurbits](#) by Brent Loy, former researcher emeritus, New Hampshire Agricultural Experiment Station and professor emeritus of genetics, UNH.

## **PREVENTING DEER DAMAGE**

Massachusetts is home to a robust deer population whose feeding in vegetable and fruit crops can cause economic losses. While there are some crops that deer might not prefer, they tend to like many of the same foods that we do. Cabbage and other cole crops, lettuce, beans, as well as developing melon and pumpkin fruits are all particularly susceptible to deer feeding now. Though deer will taste many different plants, and will eat almost any plant if they're hungry enough, there are a few crops that are considered unattractive to deer, including strong-smelling plants like onions, garlic, and fennel,

nightshades like tomatoes and eggplants, and prickly plants like cucumbers and globe artichoke. As is also true for humans, rhubarb leaves are toxic to deer (though that doesn't necessarily mean they won't eat them if they're hungry!). If there are wood-edged areas of your farm that are particularly at risk for deer invasion, consider planting some of the less attractive crops in these fields. If you can't keep them out with unappealing crops, there are several other options available for managing deer damage on your farm. Factors such as the amount of crop land that you're trying to protect and the time and resources available will determine which options you choose.



*Bird netting protecting lettuce from deer. Photo: G. Higgins*

**Row cover or netting** can keep deer out of vulnerable crops. Floating row covers over hoops work well, but can be a lot to manage and may add unnecessary heat at this point in the season. Deer also often step onto row-covered beds, ripping the cover. Wider mesh netting can be used either as fence, or as row cover, and can be applied over a crop with a perimeter of T-posts (see photo).

**Temporary electric fencing** is the most cost-effective measure to prevent deer damage. Deer can jump over fences that are 7 feet or higher. Electric fences are generally installed well below this height and so work as mental barriers more than physical ones. They rely on deer's poor depth perception and habitual behaviors to confuse and deter deer.

For small fields of a few acres or less, portable fences of electric wire, woven rope, or tape will provide relief from deer. Solar or battery-powered chargers make it possible to set up a fence even in remote locations. Woven ropes and tapes enhance protection by being very visible to deer, even at night, while providing an electric shock on contact. Deer perceive black and white rather than color and more readily see objects that are moving, so fences that contrast to the environment and have movement—you can tie black and white fabric or mylar strips to the fence—will be more easily seen. Such fences are also more visible to people. As few as two strands of electric wire can be used to protect crops; three strands are better. In a two-wire fence, the first wire should be at a height of 10-12 inches and the second at 30-36 inches. A three-wire fence can have strands at 12, 24, and 40 inches. Double fences—that is, two fences in parallel, spaced about 3-5 feet apart—can be very effective if deer are jumping over a single fence. The outer fence can be a single strand at approximately 36 inches. Multi-strand fences can also be installed at a 45-degree angle, which will help to deter deer from attempting to jump over the fence. (See Resources section below for links to more in-depth descriptions of various temporary and permanent fence designs and materials).

Deer are well insulated over most of their body with fur, dampening the shock of an electric fence. Baiting the fence, with store-bought lures or a piece of aluminum foil smeared with peanut butter, will entice the deer to contact the fence with its more sensitive nose and tongue, and help to educate a deer to respect the fence. Space the bait about 3 feet apart around the perimeter and keep the fence baited for at least a few weeks after the fence is installed. Be sure to regularly check the strands to ensure that they have adequate charge—about 2.5 kilovolts for a baited fence. Portable voltage readers can be purchased for as little as \$10-\$20. Make sure fence lines are well maintained, as weeds or grass touching the wires will reduce the charge. Electric fence supplies can be found easily on the internet, at farm supply centers, or through specialty fencing companies. Electric fences work best when deer are tentative and moving along an unfamiliar path. To get the deer to investigate a new area and contact electrified bait, you may need to disrupt their normal path by placing logs or brush along the route and forcing them to approach the fence from a different point.

**Permanent fencing** is the most effective long-term solution to deer damage. In this case the fence creates a barrier rather than just a deterrent. A non-electric fence should be at least 8 feet high and either have a lower bottom wire than a movable electric fence—about 6 inches off the ground—or be of mesh construction. Permanent fencing, usually high tensile woven wire fence, can be expensive to install but cost-effective in the long run as it only needs to be put up once and is very effective at keeping deer (and other animals) out of fields. You may wish to consult a professional fence installation company (e.g., River Valley Fencing, Wellscroft, Northeast Farm and Fence Service). In Massachusetts, the Department of Agricultural Resources (MDAR) has grant programs such as the [Agricultural Food Safety Improvement Program \(AF-SIP\)](#) that can help fund the installation of wildlife fencing—the Program is not currently accepting applications, but will be this fall. Contact Laura Maul ([laura.maul@state.ma.us](mailto:laura.maul@state.ma.us), (617) 626-1739) for more information on this and other agricultural grant programs.

Fence maintenance is critical in both applications. If a tree falls on the fence or a hole is cut in the fence, it should be repaired immediately. Once deer have gotten inside and discovered the crop, it will be harder to keep them out, even with an electric fence. No gaps should exist in the fence; access must be provided through gates that are closed at all times. Fences should have a clear outer perimeter, at least 5 or 6 feet on the outside of the fence, so deer have to cross an opening before encountering the barrier. This enhances visibility of the fence to the deer and provides the deer with a route to escape so that it doesn't jump over the fence just to get away from the shock. Deer will blunder into a fence placed tight to a wooded edge and can actually damage or take down sections of a fence simply because they do not see it very well, especially with smooth wire designs. Having a clear border will increase the effectiveness of the fence and aid in maintenance. Permanent tall wire fences, while more expensive, may be a worthwhile investment on the home farm, or where you will always be planting vulnerable crops. Moveable electric fences make sense in fields that are rented, far from the home farm, or are planted to different crops each year.

**Scare devices** can be effective when deer populations and pressure are fairly low. There are devices that make noises, squirt water, give off bright light, or are made to look like predators. Some are motion sensitive. Placing these tools at field edges where deer are entering can help to scare them off, and can be used in addition to fencing. Deer get accustomed to these devices pretty quickly, though, so they must be moved frequently.

**Repellents** reduce deer damage by making the target crop taste or smell unpalatable to deer. All repellents claim to reduce, not eliminate, deer damage and don't provide reliable protection when deer densities are high. To achieve this reduction, they must be consistently applied and reapplied as directed. Once a feeding pattern has been established, repellents are usually less effective. Repellents fall into three categories: taste, odor, and combination taste and odor. Different formulations allow the user to change the repellent and keep the deer on guard by providing a change in the range of odors and tastes.

For protecting vegetable and fruit crops, make sure that a product is approved for use on edible crops. Certain taste-based repellents can be used on edible plants such as vegetable crops, fruits, berries, nuts and herbs, but they must be washed off prior to eating. The following repellents are among those approved for use on edible plants: Hinder (ammonium soaps of higher fatty acids; *labeled for apple, pear, and carrots only*), Millers' Hot Sauce (capsaicin), Deer Stopper (putrescent egg solids, rosemary and mint oils), and Deer Off (putrescent egg solids, capsaicin, garlic oil). Some growers report that foliar applications of fish emulsion, which is sold and applied as a nutrient supplement, have an additional benefit of repelling deer.

Repellents should be applied before damage is likely to occur, when precipitation is not expected for 24 hours, and temperatures will remain between 40-80°F for that period. Hand-spray applications may be cost effective on small acreages, while machine sprays will reduce costs for larger areas. If the materials are compatible, spray costs may be reduced by adding repellents to pesticide sprays.

Maintaining optimal densities of deer populations through habitat management and hunting can help to keep deer pressure in vegetable crops low. The Massachusetts Division of Fisheries and Wildlife sets management goals and regulates hunting during three designated seasons. For more information on white-tailed deer and this control strategy, see the official Massachusetts website on Deer Management at <https://www.mass.gov/service-details/deer-management>

#### **Resources for deer fencing design and construction:**

- North Carolina Wildlife Resources Commission, [Fencing to Exclude Deer](#)

- VerCauteren, K. et al., [\*Fences and Deer-Damage Management: A Review of Designs and Efficacy\*](#), Wildlife Society Bulletin (2006).
- Buskirk, D., [\*Deer Barriers...Fencing, Repellents, Dog Restraint Systems\*](#), Michigan State University Bulletin (2002).
- Craven, S. & Hygnstrom, S., [\*"Deer". The Handbook: Prevention and Control of Wildlife\*](#), Internet Center for Wildlife Damage Management (1994).

--Written by L. McKeag and R. Hazzard

## NEWS

### GUIDANCE FOR FLOOD-AFFECTED FOOD CROPS

With the excessive amount of rain we've received recently, there are many farms that have experienced flooding, particularly in the western end of the state. If your farm is susceptible to flooding, please read the FDA's **Guidance for Industry: Evaluating the Safety of Flood-affected Food Crops for Human Consumption**, found at this link: <https://www.fda.gov/regulatory-information/search-fda-guidance-documents/guidance-industry-evaluating-safety-flood-affected-food-crops-human-consumption>

Per the guidance: "If the edible portion of a crop is exposed to flood waters, it is considered adulterated under section 402(a)(4) (21 U.S.C. 342(a)(4)) of the Federal Food, Drug, and Cosmetic Act and should not enter human food channels. There is no practical method of reconditioning the edible portion of a crop that will provide a reasonable assurance of human food safety. Therefore, the FDA recommends that these crops be disposed of in a manner that ensures they are kept separate from crops that have not been flood damaged to avoid adulterating "clean" crops (Ref. 1, 2, 3)."

The guidance also addresses potential microbial, chemical and fungal contamination, the safety of food crops when flood waters did NOT contact the edible portion of the crop, as well as flooding vs. pooled water.

Please contact MDAR's Produce Safety Division if you have any questions regarding the safety of your crops: Kate Bailey, Produce Safety Inspector, Phone: 857-315-7478, [Kate.Bailey@Mass.Gov](mailto:Kate.Bailey@Mass.Gov)

### UMASS EXTENSION DIAGNOSTIC LAB NOW ACCEPTING HEMP SAMPLES FROM LICENSED GROWERS

The UMass Extension Diagnostic Lab is now accepting hemp samples for analysis and evaluation of insect and disease problems. In addition, a special program in 2021 offers only licensed hemp growers the opportunity to have nematode analysis conducted for free, including a site visit!

For both disease diagnostic services and nematode analysis, samples will be accepted only from licensed hemp growers in Massachusetts. Submission of a copy of the grower's license is required.

For information on collecting, packaging, and shipping hemp samples to the lab, as well as the free nematode analysis program, see the lab's [Hemp Diseases and Nematode Assays](#) page or call Dr. Angela Madeiras at [413-545-3209](tel:413-545-3209).

### LET US KNOW HOW YOU USE THE NEW ENGLAND VEGETABLE MANAGEMENT GUIDE!

Do you use the New England Vegetable Management Guide as a resource? If so, we want to hear from you!

The authors of the New England Vegetable Management Guide want to learn more about how the guide is used, so that we can make it as useful as possible. While we are revising the guide, we have designed a short survey to better understand what YOU value in the guide. Please consider taking 5 minutes to provide your feedback and suggestions here: [https://unh.az1.qualtrics.com/jfe/form/SV\\_9Ag68WJ1uyjreE6](https://unh.az1.qualtrics.com/jfe/form/SV_9Ag68WJ1uyjreE6).

### COMMERCIAL GRAPE GROWERS' SURVEY

The UMass Extension Fruit Program is conducting a survey of commercial grape growers to gather information on how to better serve this audience. If you are a commercial grape grower in New England or New York, please fill in the survey below. Your response will be used to prioritize future Extension and research efforts. It should take between 5-15 min. The deadline is Friday August 6, 2021.

Completing this survey will automatically enter you into a raffle to win a \$150 gift certificate & a free subscription to

the Grape Notes Newsletter.

**Survey link:** [https://umassamherst.col.qualtrics.com/jfe/form/SV\\_dhz2MMPOdvXYC9g](https://umassamherst.col.qualtrics.com/jfe/form/SV_dhz2MMPOdvXYC9g)

## **TREE FRUIT & SMALL FRUIT GROWERS: WEEDS NEEDS SURVEY**

Since 2016, the UMass Extension Fruit Program has been operating without an official weeds specialist. The Fruit Team has created this brief survey to assess current weed management challenges in commercial orchard, vineyard and small fruit cropping systems. The results of this survey will be shared but all personal information will be kept confidential. **Survey link:** <https://forms.gle/4Ty8RS5n1ETXiTE9>

## **SNAP PROCESSING EQUIPMENT AVAILABLE FOR FARMERS AND FARMERS MARKETS: APPLY BY SEPTEMBER 24<sup>TH</sup>**

Free mobile SNAP processing equipment from Novo Dia Group is now available to direct-marketing farms and farmers' markets through the Department of Transitional Assistance, in collaboration with the Department of Agricultural Resources, and with financial support from the United States Department of Agriculture (USDA). Eligibility is limited to SNAP-authorized farms and markets that do not currently have working equipment received through previous federal grants. Equipment will not process credit/debit. For complete program details and a link to the application, go [here](#).

Are you looking for SNAP processing equipment but not eligible for this program? Learn about other options, [here](#).

**Questions?** Contact David Webber, 617-626-1754 or [David.Webber@mass.gov](mailto:David.Webber@mass.gov) or [DTA.HIP@mass.gov](mailto:DTA.HIP@mass.gov).

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## **USDA ACCEPTING APPLICATIONS TO HELP COVER COSTS FOR ORGANIC CERTIFICATION**

Organic producers and handlers can now apply for U.S. Department of Agriculture (USDA) funds to assist with the cost of receiving or maintaining organic certification. Applications for the [Organic Certification Cost Share Program](#) (OCCSP) are due Nov. 1, 2021.

OCCSP provides cost-share assistance to producers and handlers of agricultural products for the costs of obtaining or maintaining organic certification under the USDA's National Organic Program. Eligible producers include any certified producers or handlers who have paid organic certification fees to a USDA-accredited certifying agent during the 2021 and any subsequent program year. Producers can be reimbursed for expenses made between Oct. 1, 2020 and Sept. 30, 2021 including application fees, inspection costs, fees related to equivalency agreement and arrangement requirements, travel expenses for inspectors, user fees, sales assessments and postage.

For 2021, OCCSP will reimburse 50% of a certified operation's allowable certification costs, up to a maximum of \$500 for each of the following categories (or "scopes"):

Organic farmers and ranchers may apply through an FSA county office or a participating state agency.

## **EVENTS**

### **ECONOMICS OF WINTER SPINACH PRODUCTION: THREE CASE STUDIES**

**When:** Wednesday, September 1, 12-1 pm

**Where:** Zoom

**Registration:** <https://forms.gle/Q89UMus1kWMV2XBq8>

Last winter, the UMass Extension Vegetable Program followed three farms through their winter high tunnel spinach production process, to collect examples of the range of systems of New England winter greens growing. Each farm provided detailed records of spinach inputs, labor, yield, and sales from one high tunnel in order to create an enterprise budget. At this lunchtime Zoom presentation, we will summarize our findings and compare a few key pieces of data from the enterprise budgets. Ryan Karb of Many Hands Farm Corps and Danya Teitelbaum of Queens Greens will join us to answer questions about spinach production on their farms. Join us to hear about these case studies and

start thinking about your own winter spinach production goals, techniques, and bottom-lines!

**Questions?** Contact Genevieve Higgins, [ghiggins@umass.edu](mailto:ghiggins@umass.edu)

## **SUCCESSFUL VALUE ADDED FOOD PRODUCT DEVELOPMENT: MANAGING FOOD QUALITY AND SAFETY**

Are you an entrepreneur developing new and exciting products? Do you have questions about ensuring the safety of your product? If so, this is the program for you! This course is a program designed specifically to address product development and food safety issues faced by small processors. Throughout the course, we will introduce the food science basics, important considerations when developing a new food product, share key elements required for product labeling, and provide an overview of key regulatory requirements for small and emerging food businesses, such as entrepreneurs and local food processors.

### **Upcoming Sessions:**

- [Successful Food Product Development for New Food Businesses: Managing Food Quality & Safety- NFU and UoA](#): Tuesday, August 31, Wednesday, September 1, and Thursday, September 2, 10am-2pm

## **MASSACHUSETTS TOMATO CONTEST TO BE HELD ON AUGUST 24**

The 36<sup>th</sup> Massachusetts Tomato Contest will be held in the KITCHEN at the Boston Public Market on Tuesday, August 24. Tomatoes will be judged by a panel of experts on flavor, firmness/slicing quality, exterior color and shape. Always a lively and fun event, the day is designed to increase awareness of locally grown produce.

Farmers who want to submit entries can bring tomatoes to the market between 8:45 am and 10:45 am on August 24 or drop their entries off with a registration form to one of the regional drop off locations on Monday, August 23. Drop off locations include sites in Great Barrington, South Deerfield, Worcester, Dighton and West Newbury. These tomatoes will be brought in to Boston on Tuesday.

For complete details, including drop off locations, contest criteria, and a registration form, [click here](#). Be sure to include this [registration form](#) with your entries.

*The 36<sup>th</sup> Tomato Contest is sponsored by the Massachusetts Department of Agricultural Resources, New England Vegetable and Berry Growers Association and Mass Farmers Markets in cooperation with the Boston Public Market.*

## **WEBINAR: SPOTTED LANTERNFLY TRAPPING UPDATE**

**When:** Tuesday, August 31, 2021, 10-11:30AM

**Where:** Online

**Registration:** <https://register.gotowebinar.com/register/310308986140432140>

Join UMass Extension for this free grant-supported webinar for an update on the invasive spotted lanternfly (*Lycorma delicatula*; SLF) as well as trapping research and monitoring efforts from:

- Dr. Joseph Elkington and Dr. Jeremy Anderson, UMass Dept. of Environmental Conservation
- Dr. Miriam Cooperband, Forest Pest Methods Laboratory USDA-APHIS-PPQ-CPHST
- Tawny Sinisky, UMass Extension's Landscape, Nursery and Urban Forestry Program Entomologist
- Dr. Jaime Piñero, UMass Extension's Fruit Program and the Stockbridge School of Agriculture

Landscapers, arborists, grounds managers, foresters, urban foresters, orchardists, fruit growers, and many other land managers and professionals are encouraged to attend this free update that is open to anyone interested in attending! Please note: while participants from anywhere are invited to attend, much of the material presented will be specific to Massachusetts and New England.

*1 pesticide contact hour for categories 25, 27, 29, 35, 36, 48, and Applicator's (Core) Licenses available.*

*This free webinar is made possible by funding support from the UMass Center for Agriculture, Food, and the Environment's Integrated Research and Extension grant program.*

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*Vegetable Notes. Genevieve Higgins, Lisa McKeag, Susan Scheufele, Hannah Whitehead co-editors. All photos in this publication are credited to the UMass Extension Vegetable Program unless otherwise noted.*

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